Kentucky State Nature Preserves Commission

Biennial Report 2013

KENTUCKY STATE NATURE PRESERVES COMMISSION MEMBERS

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Cover photo of the Eastern hellbender (*Cryptobranchus alleganiensis)*
By John R. MacGregor

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Biennial Report
of the
Kentucky State Nature Preserves Commission
January 2013

INTRODUCTION:

This biennial report is submitted to the Governor and the General Assembly as directed by KRS 146.410 et seq., the Kentucky State Nature Preserves Act, which created the Commission in 1976. The agency is directed by five Commissioners appointed by the Governor. Currently, staff level is 17 full-time positions, a decline of six from a level of 23 several years ago, caused by declining budgets. Our current General Fund level has been reduced to what it was 10 years ago.

Regardless of these limitations, it is the **mission** of the Kentucky State Nature Preserves Commission **to protect Kentucky's *natural* heritage** by:

1. **Identifying, acquiring and managing natural areas that represent the best known natural occurrences of rare native species, natural communities and significant natural features in a statewide nature preserves system.**
2. **Working with others to protect biological diversity.**
3. **Educating Kentuckians as to the value and purpose of nature preserves and biodiversity preservation.**

MAJOR ACCOMPLISHMENTS FOR 2011-2012:

- **Additions to the State Nature Preserves:**

Laurel Fork SNP	Whitley County	1863.96 acres (new preserve)
Tom Dorman SNP	Garrard County	90.073 acres (addition)
Apple Valley Glades SNP	Bullitt County	37.129 acres (new preserve)
Terrapin Creek SNP	Graves County	9.16 acres (addition)
Total		**2000.322 Acres**

- The Commission lists 388 plant species as state endangered, threatened or special concern and of which, 137 are protected in perpetuity on state nature preserves.

- The Commission lists 347 animal species as endangered, threatened or special concern and of these, 146 have been protected on state nature preserves.

- The Commission has protected 21 high quality examples of Kentucky's 62 natural community types as state nature preserves.

- **Four New Registered Natural Area:**

  1. Jefferson Memorial Forest, owned by Louisville Metro gives special recognition to 2,472 acres of this 6,218 acre forest, perhaps the largest municipal-owned forest in the country.

  2. Camp Burnamwood in Estill County protects 472 acres and a unique shale glade system as part of the Grassy Knob Ridge system of upland native forests.

  3. Jessamine Creek - R.J. Corman registered a 1.28 mile segment of this stream corridor located upstream of Jessamine Creek Gorge. An aquatic survey confirmed 14 species of native fish, while a terrestrial survey indicated the potential for mature forest development.

  4. Reynolds Prairie in Garrard County is a remarkable grassland representing 38 acres of a natural system that was once more extensive in the Bluegrass Region.

- **One New Nature Preserve and One Pending:**

  - **Apple Valley Glade** State Nature Preserve in Bullitt County is a unique limestone glade and woodland system. It has many rare plant species including Kentucky gladecress, which only grows along the Salt River and nowhere else in the world. The Commission owns 37.129 acres and has a conservation easement on an additional 23.229 acres.

  - **Laurel Fork** in Whitley County is part of one of the largest forest blocks in Kentucky. It contains significant natural areas that include federally listed mussels and globally rare plant species. The Commission purchased 1,863.93 acres in December 2012 and will dedicate it in early 2013.

I. PROTECTING KENTUCKY'S BIOLOGICAL DIVERSITY:

The Commission's statutory directive is to protect the biological diversity ("biodiversity"), of Kentucky. Why is it of such great importance? Biodiversity is the abundance of **plants, animals** and **other organisms,** and their interactions with each other and the environment. These living things form a **mosaic of biological communities** or ecosystems, and the complex diversity of life that makes **Kentucky unique.** This **diversity** of life is the fundamental characteristic which enables living organisms to evolve and survive on our planet.

Kentucky's abundance, from wetlands teeming with life along the Mississippi River to lush Appalachian forests in the east, is as extraordinary as it is beautiful. Kentucky is home to **102 endemic** species, subspecies and varieties that are **found nowhere else in the world.** The southeastern U.S. is the ***global*** center of diversity for several freshwater aquatic species, as there is a greater concentration found here than anywhere else in the world. These include **salamanders, freshwater fishes, mussels and crayfish.** Kentucky is **ranked *third* and *fourth*** respectively after only Alabama and Tennessee for the number of freshwater fish and mussel species found in our state. Kentucky is **5th in the U.S.** for the number of **crayfish** species. The Green River which flows through Mammoth Cave National Park has been ranked nationally for its aquatic diversity. Our forests in the east, which are classified as "mixed mesophytic", are considered one of the **most diverse temperate deciduous forests** in the world, rivaling similar forests in China. **Blanton Forest State Nature Preserve**, which protects one of the largest old growth forests east of the Mississippi River, is a sanctuary for the mixed mesophytic forest.

But 12,000 years of human habitation have had an impact on the landscape, most intensely since the time of the pioneers. From 1780 to 1980, **wetlands** in Kentucky **declined** from about 1.6 million acres to about 380,000 acres, a loss of over **80%.** Forest coverage has declined from an estimated 85-90% of the state to about 47%. The loss of forested habitat has contributed to declines in bird populations, increased erosion and excessive sedimentation of streams. While Kentucky is fourth in the U.S. for **freshwater mussel** diversity, human impacts to streams and rivers have **reduced their populations so severely** that they have become one of the **most imperiled groups** in the country. Twenty percent of Kentucky's 104 mussel species (21 species total) are extinct or extirpated (no longer surviving in the state).

NatureServe published a report in 2002 ranking all 50 states on their level of biodiversity. **Kentucky ranked 23rd for total species diversity**, yet ranked 9th for having the most extinct species. This is not a good list on which to be near the top.

Should we be concerned about the loss of species and habitats? Protecting the diversity of species and the habitats they live in is our best insurance for a stable, fully functional, livable environment. It provides the greatest number of options for meeting our needs and especially for recovery following an environmental calamity. Over reliance on one species has caused human tragedy, especially when it involves a food source. Potato blight caused the Great Irish Famine in the 1840's and over a million deaths. Having multiple wild species available provides a genetic storehouse of species adaptations that can improve domesticated species. The Southern Corn Blight of the 1970's was overcome by using genetic traits found in wild ancestors of domesticated corn, which were resistant to the blight. The more plant and animal species we have to draw upon, the greater our resources for food, medicines and the myriad other products that contribute to the quality of our lives.

Here are a few other reasons to protect Kentucky's biodiversity:

1. **Medicines** – **Forty percent of all medical prescriptions** dispensed in the United States are derived from plants, animals and microorganisms, or are synthesized versions of their special therapeutic compounds.
2. **Wildlife-related Recreation** – Our natural areas draw **millions of visitors** each year to Kentucky's state parks, nature preserves and other natural lands. **Wildlife recreation** - hunting, fishing, and wildlife watching in Kentucky generated a ***$1.9 billion boost*** to the economy in 2006, based on the most recent data from the National Survey, U.S. Fish and Wildlife Service. In 2011 the total statewide economic impact from ***Kentucky State Parks was $128.8 million***.
3. **Economic values –** Plants and animals are the basis for countless commercial products including **food** and **clothing. Wood** provides building materials and a host of other products. The University of Kentucky College of Agriculture in its "*Economic Outlook for 2013*" reports that despite declines from a still weak housing industry, the 2012 **forestry economic impact** on Kentucky's economy was ***$6.357 billion*** in direct contributions, with nearly a $10 billion total impact. "With wood industries in 109 counties, the forestry sector is important to both rural and urban economies," the report concludes. As the non-native Emerald Ash Borer continues to attack ash trees (used in Louisville Slugger bats) different tree species may need to be substituted or perhaps pest resistance can be found in one of the several species of ash trees.

4. **Eco-Services** – Forests **provide oxygen** to the atmosphere, help **cool the climate, absorb air pollution** and filter surface waters. This summer when you drive from an urban area into a rural wooded area, roll the windows down and feel the drop in temperature. **Wetlands purify water** runoff from uplands and are sometimes referred to as "nature's kidneys" releasing clean water to streams and rivers that provide drinking water. Songbirds and bats reduce crop damage by feeding on harmful insects and reduce mosquito populations. Bees and butterflies and other insects **pollinate food crops and wildflowers.**
5. **Biomimetics** – Living species serve as models for machines and materials and as guides for engineering. **Velcro** was created in mimicry of plant seeds that adhere tightly to animal fur. John Hopkins University engineers are studying the flight of butterflies to find the secrets of their maneuverability. The water repellant abilities of lotus leaves have been mimicked to develop **stain-resistant paints**.

CAUSES OF BIODIVERSITY LOSS:

A. LAND CONVERSION – The number one threat to our natural areas and the biological diversity they sustain is land development – i.e. **habitat loss.** High quality **natural areas support a great diversity of species**, unlike our managed landscapes which we populate with relatively few preferred species. Suburban lawns are planted in fescue and a relatively few ornamental plant and tree species that thrive in urban conditions. Farmlands are largely fescue pastures or monoculture row crops. Certainly these managed landscapes are both desirable and necessary, but an unintended consequence is a **loss of biodiversity.** As the conversion of land continues to increase, it becomes more **critical to protect the best remaining natural areas** that serve as reservoirs of Kentucky's biological diversity. If we do not protect key areas they will continue shrinking to such a small scale that they will not be able to **sustain their diversity over time.**

A quick review of the data illustrates the continuing loss of natural lands. The U.S. Dept. of Agriculture's Natural Resources Inventory for Kentucky, 1982-1997 states, "In Kentucky, urbanization has caused a large land use change. In 1982, there were 1.15 million acres of urban areas and roads. In 1997, this increased to 1.74 million acres… a **52 percent growth in urban and road areas over the 15-year period**."

The Natural Resources Inventory is released every 5 years. The 1992-97 report reveals that

Kentucky experienced a total Rural Land Loss (farms and forests) of **130 acres per day.** This rate of loss increased in 1997-2002 to **200 acres per day.** The rate slowed in 2002-2007 to **80 acres per day** (presumably due to the economic downturn). The 2012 figures are not yet available. Though the rate of loss fluctuates, it clearly demonstrates a non-stop process of land conversion – and the loss of natural lands. Even once common species like the **bob-white quail** are becoming scarce because of habitat loss. Over 67% Kentucky's quail population has been lost since 1960, according to the KY. Dept. of Fish and Wildlife Resources (KDFWR).

When compared to the seven surrounding states, **Kentucky has protected the smallest percentage of its land.** State owned lands are approximately .9% (less than one percent) of the state. When federal lands are added, including military bases, this figure increases to 7.5%. To be competitive with other states from a **quality of life** perspective and attract better economic development, Kentucky needs an expanded land stewardship and conservation initiative. The 2008 General Assembly created the **Land Conservation and Stewardship Task Force** which recommended a larger, sustained funding mechanism to acquire and conserve natural lands.

Conserve Kentucky is a partnership that formed to continue the work of the Land Conservation Stewardship Task Force. The Commission's director participates on the Conserve Kentucky steering committee, which continues to research funding mechanisms to develop a proposal to bring to the General Assembly. Conserve Kentucky conducted a public opinion survey in 2011 that found **83% of voters** would support a constitutional amendment to dedicate additional funds to protect natural lands, waters and wildlife - a very strong level of public support.

B. <u>INVASIVE SPECIES</u> – **The second greatest threat** to our native species diversity is the invasion by exotic (non-native) species. Invasive species like **kudzu, Canada thistle, emerald ash borer, hemlock wooly adelgid and zebra mussels** multiply and spread rapidly. They choke out and displace native species, often the rarest ones. The **U.S. Government Accounting Office** has long recognized the enormous costs in **billions of dollars in damage** to agriculture, natural areas, businesses and consumers caused by invasive species. **Kentucky farmers fight thistles and Johnson grass**, which are also a scourge for natural areas managers. Kudzu is the most widely recognized invasive plant, but others like bush honeysuckle and garlic mustard are rapidly overwhelming the understory of forests in the Bluegrass area. Lexington has financed a campaign to remove the bush honeysuckle, which envelopes New Circle Road. Unfortunately,

new invasive species continue to arrive in the United States, due to our global economy. The Asian long-horned beetle, another serious threat to our forests has been detected in southern Ohio. It is only a matter of time before this pest arrives in Kentucky.

Historically, **American chestnut blight** and **Dutch elm disease** inflicted a devastating toll on these two very important trees, substantially changing our forests. More recent forest threats include the **emerald ash borer** which has killed multitudes of ash trees in northern states, including Ohio and Indiana. It arrived in Kentucky in 2009 and the outlook is grim for the ash trees that are common in forests, parks and urban areas. The **hemlock wooly adelgid** is an insect pest that has decimated hemlock forests in eastern states and the Great Smoky Mountains. It was found in Harlan County in 2006. All nine of the state nature preserves in Bell, Harlan and Letcher counties, including **Blanton Forest**, the state's largest old growth forest are infested. This insect slowly kills hemlock trees which make up a significant portion of the forest canopy in the southeastern region of the state. The Commission's stewardship crews have treated over 31,000 hemlock trees in areas critical to the protection of rare species dependent upon a hemlock canopy. Secretary Len Peters of the Energy and Environment Cabinet declared the hemlock wooly adelgid **a public nuisance** in January 2010 because of its threat to our forests.

C. CLIMATE CHANGE – "Climate change **is real**….Climate change is **not a distant threat**; it is **occurring here and now**… The unmistakable signs of a rapidly changing climate are everywhere – melting glaciers, heat waves, rising seas, flowers blooming earlier, lakes freezing later, migratory birds delaying their flights south. No geographic region is immune", declares the **U.S. Fish and Wildlife Service** (USFWS) website, dated December 2, 2010. The USFWS also states that climate change, "Is the **single greatest conservation challenge of the 21st century**; ….The Service is already witnessing and documenting the effects of climate change on fish and wildlife and their habitats, and accelerated climate change is magnifying impacts on water and land resources, agriculture, and biological diversity.

"Accelerating climate change will exacerbate all of these resource threats (i.e. habitat fragmentation, pollution, invasive species, disease, and threats to water quality) affecting our nation's fish, wildlife, and plant resources in profound ways. While many species will continue to thrive, some populations may decline, many will shift their ranges substantially and still others will face increased risk of becoming extinct. Others will survive in the wild only through direct and continuous intervention by wildlife and fisheries managers. This defining challenge for the

conservation community requires the service and its partners to apply the skill, determination, creativity and commitment to conserving the nation's natural resources that have defined the American conservation movement since its inception more than 160 years ago."

U.S. Fish and Wildlife Service website, Dec. 11, 2012.

Climate change will unquestionably be a tremendous challenge to protecting Kentucky's biodiversity. The only uncertainty is how severe it will become. Localized effects will be very difficult to predict, especially with the extreme weather events it will bring, but one thing is clear – we will have to work on a **landscape level.** This means protecting larger areas and establishing corridors to connect areas of high biodiversity to facilitate the migration of animals and plants as they are thrust into an unprecedented period of rapid ecological change.

II. STATE NATURE PRESERVES AND STEWARDSHIP:

One of the Commission's most effective tactics for protecting our biodiversity is to acquire the best natural areas, with the greatest concentration of rare species, for inclusion in the state nature preserve system. The Commission manages **61 preserves** containing **27,180 acres.** The primary purpose of nature preserves is to protect rare species and the best examples of Kentucky's varied natural habitats. They also provide great opportunities for the **public to experience our best natural lands**, with over **20,600 visitors** last year. They are an incomparable resource for **environmental education** from elementary school to graduate student research. Stewardship of the nature preserve system requires **specialized expertise in ecosystem restoration** techniques such as prescribed burning and invasive plant control. Needs range from researching the viability of a rare species population, to creating interpretive materials for the public, to building hiking trails.

Nature preserves are often thought of as areas in an undisturbed natural state, best left to the care of "Mother Nature." Unfortunately, there are too many threats to these high quality natural areas for a hands-off approach. Threats come in the form of unauthorized use of ATVs, timber theft, utility corridors, degraded adjoining land, severe storms, etc. But, even more relentless is the proliferation and encroachment by non-native invasive species. **Invasive plants, animals and diseases plague the preserves** and would overwhelm the rare native species we protect without our vigilance.

The Commission also holds **conservation easements** on **private properties** with significant populations of rare species. We have protected 116 acres this way. Conservation easements protect a population of the federally endangered plant Braun's rockcress, maternity caves for the federally endangered gray bat, and Kentucky gladecress, a state endangered plant. Conservation easements are a **less costly** method of protecting a natural area, avoiding the price of a full land purchase.

One of our major acquisitions in 2012 was the Laurel Fork property in Whitley County that contains significant natural areas including a stream with federally listed mussels and globally rare plant species. Laurel Fork is also part of one of the largest forest blocks in Kentucky and it is the first step toward an even larger protected area. This new preserve, our 61st, totals 1,863.93 acres and will be dedicated in early 2013.

Stewardship needs have steadily increased. All preserves require routine maintenance such as boundary posting and inspections. Habitat restoration, invasive species control, trail construction or rare species monitoring vary with each preserve. A number of preserves require **intensive management with prescribed burning to restore** the integrity of natural communities and ensure the survival of rare species.

A less visible threat to the nature preserves comes from our **growing inability to provide sufficient stewardship.** Two full time positions became vacant in the second quarter of 2012 and remain unfilled. Since May, the 25 preserves in the western half of the state have received little attention and are vulnerable to illegal activities and threats to the biological integrity of each. We have been unable to fund two critical interim positions for the last 4 years, losing the ability to carry out many time intensive tasks. Invasive species control requires years of perseverance to contain the spread or eliminate a species from a site. **Hard work from past years is being erased** as invasive species rebound in the absence of continued control. Safety may be compromised on some trails as we struggle to maintain infrastructure such as bridges and railings. The Commission needs a separate **infrastructure maintenance budget** to provide for interim salaries and equipment. We have assisted the creation of a non-profit "Friends of KSNPC" to explore the potential for donor support to meet these needs.

The 61 nature preserves are scattered across the Commonwealth from the banks of the Mississippi River to Pine Mountain on the Virginia border. Two regional preserve managers are stationed in satellite offices in Bowling Green and Whitesburg to reduce travel costs. **We lost a full time position in 2010** when one of two stewardship assistants resigned and we lacked

funding to rehire. Budget cuts in the current biennium have resulted in leaving Stewardship vacancies unfilled, worsening a bad situation. The preserve system continues to expand, but due to CAP reductions and budget cuts, we have **not been able to add new stewardship staff in over 12 years** and **lost one position in 2010 –** yet we have ***added 13,816*** preserve ***acres!***

The constantly growing work load is overwhelming. Crucial tasks go uncompleted. There are **27,180 acres** in the nature preserve system, but ***only 5 staff*** (when vacancies can be filled) to manage them. Without sufficient stewardship these high quality natural areas and the rare species they shelter are put at risk and the quality of the visitor experience will decline. To address our immediate needs, **two additional preserve managers** are requested to divide the oversized eastern and western regions. One would be based in western Kentucky for the Jackson Purchase area. **Two additional full time stewardship assistants** and **4 seasonal/interim** workers are needed to rotate among the preserves, conducting prescribed burns, controlling exotics, building trails, maintaining infrastructure, marking boundaries and restoring habitat.

The preserves in southeastern Kentucky will continue to require a significant amount of staff time and resources due to their size, remoteness and the need to provide for visitor access. We continue to have **encroachment problems and illegal trespass** on our nine Pine Mountain preserves and those on Stone, Cumberland and Brush Mountains as well. Damage from **illegal off-road vehicle use is increasing.** Areas set aside specifically for all-terrain vehicles are being developed, but more are needed to keep pace and prevent spill over to conservation lands. The assistance of **local law enforcement** will be necessary to restrict off road vehicle riders to areas authorized for such heavy usage.

To respond to the increasing demands of preserve management, the Commission makes good use of **partnerships to provide assistance.** During the biennium, the Commission received assistance from Americorps to build a trail at Beargrass Creek SNP in Jefferson County. Custodial care of two preserves has been assigned to other organizations. We use Memorandas of Agreement with other public agencies and private organizations to assume partial responsibility for the costs of preserve maintenance and operation, when we can find willing partners. Agreements are in effect with the Louisville Nature Center, the Jefferson County Board of Education, the Blackacre Conservancy, the Floracliff Board (Fayette County), the "Friends of Lower Howard's Creek (Clark County), and Livingston County Natural Area. The Commission continues to **seek volunteers** including scout troops, school groups, and members of organizations such as the Sierra Club and the Kentucky Native Plant Society.

MAJOR STEWARDSHIP ACCOMPLISHMENTS: 2011-2012:

- Acreage needing **prescribed burns** has increased each year. Yet, grassland communities at seven preserves are becoming more open as woody vegetation is decreased by fire.
- **Invasive plant control.** Repeated efforts to control kudzu and Asian bittersweet have met with success on several preserves, but with reduced staff we are seeing an increase at others.
- A project to restore the natural hydrology of one of the last un-channelized segments of a major western Kentucky stream (Obion Creek) was initiated. Restoration of the natural stream channel at **Obion Creek SNP** will continue for several years.
- The preserves branch manager served as president of the Kentucky Prescribed Fire Council, bringing recognition to the Commission's 25 years of experience with prescribed fire. The Council works to raise awareness among Kentuckians of the benefits of re-introducing prescribed fire to landscapes that evolved with it.
- Worked with **KET's *Kentucky Life*** program filming a segment on the Commonwealth's biodiversity at Blood River SNP in Calloway County.
- There was a successful reduction in **feral hogs** at Obion Creek SNP courtesy of joint efforts by the Commission and the Kentucky Department of Fish and Wildlife Resources and local government.

Fighting New Invasive Species - The **hemlock wooly adelgid**, first found in Harlan County in March 2006, **has infested all nine** of the Commission's state nature preserves on Pine Mountain as well as Natural Bridge State Park Nature Preserve. The preserves are experiencing **hemlock die-off** that will alter the landscape and damage habitat for numerous plants and animals dependent upon the cool, moist shaded areas provided by hemlocks. It will also threaten trails and visitor facilities as large dead trees fall.

The Commission and other state and federal agencies have joined with individuals and non-profit organizations to pool resources and prioritize areas to treat hemlocks. The Commission has led the way with over **31,000 trees** treated in **areas critical to visitor safety and rare species protection.**

An even **newer insect pest** threatening the forest is the **emerald ash borer.** This beetle was found in Kentucky in 2009. All species of **ash trees are threatened** by this insect pest. **Blue**

ash trees, the signature species in bluegrass savanna woodlands, have been **treated** at the Julian Savanna State Nature Preserve in Frankfort to prevent mortality of the surviving old growth trees. A threat expected in Kentucky within the next year is **Thousand Cankers disease**, which attacks **walnut trees**. The disease has been found as close as Knoxville, Tennessee. Quarantines and other efforts to minimize movement of infested walnut wood are being discussed, yet similar efforts were unable to stop the emerald ash borer from arriving in Kentucky.

White Nose Syndrome, (WNS), a disease caused by an exotic fungus affects a number of bat species and is responsible for the deaths of more than 5.5 million bats throughout eastern North America. The disease was first identified in New York in 2006 and has since spread to Canada and 19 states, including Kentucky. Six species of cave bats, all of which occur in Kentucky, are known to be affected by WNS. The cause of death is not well understood, but infected bats become uncharacteristically active during winter months using up fat reserves and body water needed to survive the winter. In some hibernacula (caves or mines used for hibernation), 90 to 100 percent of bats have died and there is no known cure for WNS. Bats play a crucial role as primary predators of night-flying insects, providing economic benefits as natural controls for agricultural and forest pests. Bats also help control insects that spread disease to people. The Commission has 3 critical bat hibernation caves on preserves at Carter Caves and Kingdom Come state parks. We are working with the Kentucky Department of Fish and Wildlife Resources (KDFWR) and the U.S. Fish and Wildlife Service (USFWS) to monitor for the disease and implement protective measures when it is found. Contamination systems for guided tours are being used at Carter Caves State Resort Park.

Funding to Purchase State Nature Preserves:

The Commission's main source of funds to purchase land for state nature preserves is the **Kentucky Heritage Land Conservation Fund** (KHLCF). From January 2011 to December 2012, the Commission purchased properties totaling $520,545.50. However, our current available balance is down to $13,412, which is insufficient for another purchase. One of the revenue sources for KHLCF is the ***Nature's Finest*** **auto license plates.**

The Commission has been very successful in seeking **additional funding** to enhance land acquisition. For example, we received a **$1,097,000** Recovery Land Acquisition grant from the **USFWS** in 2009 that was used in 2012 to purchase land to protect the federally listed rare plant, **Short's goldenrod**, and five federally-listed mussels in the Licking River.

Another source is the **Nature and Wildlife Fund,** which allows **taxpayers** to **donate** a portion of their income tax refund to the Commission by using the Kentucky income tax check-off form. Contributions are divided equally between the Commission and KDFWR. Donations reached their all-time high in 1996 but have declined steadily in part due to competition from additional tax check-off options. For the last six years donations have averaged about **$34,000 per year.** Funds donated through the tax check-off are restricted by statute to being used only for the purchase or maintenance of state nature preserves. The small amount of funds from this source are generally insufficient for a land purchase and are used for stewardship purposes.

The Commission was also selected for a mitigation grant of **$461,000** from **American Electric Power** (local affiliate, Kentucky Power) under a settlement with the U.S. EPA. Part of the grant was used to purchase acreage at Crooked Creek State Nature Preserve in Lewis County. The remaining balance of the AEP grant was used to acquire land in Whitley County along the Laurel Fork of the Cumberland River. The Commission worked with the Kentucky Natural Lands Trust and the U.S. Fish & Wildlife Service to purchase 1,864 acres on **Pine Mountain along Laurel Fork**. The Commission was fortunate to also receive an **unexpected private bequest of $202,000** in September 2012. The bequest was restricted for land acquisition and was also used to purchase the Laurel Fork property.

Note: a list of your state nature preserves, by county, is included as Appendix 3. A directory of the preserves with descriptions, location and directions are available on the KSNPC website at http://naturepreserves.ky.gov. A printed directory is available on request.

III. THE NATURAL HERITAGE PROGRAM:

How do we find the highest quality natural lands for inclusion in the state nature preserve system? The Commission uses a system known as Natural Heritage Methodology. It is a systematic process to find and rank as endangered, threatened or special concern, plants, animals and natural communities. This information enables us to make **science-based decisions** to ensure we protect the most threatened areas and rarest species. The highest ranking areas are targeted for acquisition to become state nature preserves. The Natural Heritage program is used in all 50 states, 12 Canadian provinces and 10 Latin American countries, making the Commission a partner in the largest international biological data network in the world.

Using the Natural Heritage program, we have created the most complete and accurate

database of information on rare species, natural communities and conservation lands in Kentucky. The database is the result of over 35 years of field research by Commission biologists, and the compilation of herbarium and natural history museum records and field records from both agency and other biologists. The Commission has a staff of expert biologists including:

- **Two botanists** specializing in listed rare plants.
- **An aquatic zoologist** who specializes in locating native fish and mussels.
- **An invertebrate zoologist** for multiple groups including pollinators, aquatic species and cave adapted species, many of which are found only in Kentucky.
- **An ecologist** to find and document Kentucky's varied **plant communities**; i.e. forests, wetlands, prairie remnants, barrens, etc.

The primary focus of **the ecologist** is conducting **Natural Areas Inventory** (NAI), an analysis of the state's landscape to find the best remaining natural areas in Kentucky. The NAI process **has not yet completed a full assessment** of Kentucky's 120 counties, due to limited staff and resources. We estimate that only ***one-half of one percent*** **(0.5%) of Kentucky remains in a natural condition comparable to what existed when the pioneers arrived**. Locating such sites is akin to finding "a needle in the haystack". With land development progressing, we need to complete a Natural Areas Inventory of the state.

The Commission had previously employed a **terrestrial zoologist** to survey **birds, mammals, reptiles and amphibians**, but lost this position to budget cuts in 2008. This is a serious **loss of a critical expertise**. Animal groups are some of the most widely appreciated wildlife and many are vital to the ecosystems in which they live. Without the zoologist position we lack the ability to work for the recovery of Kentucky's rarest animal species. This position is also key to securing biological inventory contracts which help fund the Commission. We plan to restore the position in 2013 by "robbing Peter to pay Paul", by converting a GIS specialist position, following a recent resignation.

MAJOR NATURAL HERITAGE ACCOMPLISHMENTS: 2011-2012:

Botanical Conservation –

KSNPC has the **only botanical conservation program in state government**. It functions as a clearinghouse for native plant information with a special focus on plants that are declining in the state. We receive federal funds to work with plants that are federally listed as endangered/threatened. In the last two years KSNPC's botanists have searched for new populations of Short's goldenrod, Braun's rockcress (both are federally-listed) and Globe bladderpod, a candidate for listing, to determine their full range in the state. We have also concluded that other **additional plant species may now be extinct in Kentucky**, after focused searches have been unsuccessful in finding a single population in the state.

Staff botanists continue to work on the recovery of existing populations of endangered plants by assisted seed dispersal to increase the number of plants. **Fameflower**, a plant found only in Kentucky in open glades in the Bowling Green area, is the focus of one of these efforts. A population of globe bladderpod, a federal candidate plant, has been established using this method.

As a result of surveys by our staff over the years, **white-haired goldenrod**, an endemic plant (found only in) the Red River Gorge, may be considered for **removal from the federal list.** A review of the species by the USFWS is planned. Intensive botanical work in the gorge has discovered a greater number of populations, indicating the species may be more secure than previously thought.

Ecological Conservation –

The ecologists engaged in several new activities including:

- Completed a 3-year project to survey **rare grasslands and dry woodlands of west-central Kentucky** that provide habitat for declining grassland plants, insects, birds (such as bob white quail) and reptiles. The Commission is taking further steps to protect the most significant areas.
- Actively working on Natural Areas Inventory of **Butler, Hancock, Ohio and Webster** counties. Most of these county inventories will be completed in 2013.
- Surveyed **Mammoth Cave National Park** for rare wetland communities (e.g. marshes, flatwoods, etc.) and their associated species (rare plants and insects).

- Author (in part) of a Central U.S. regional project assessing glades and associated xeric dry woodlands, via a partnership with the U.S. Forest Service and the Central Hardwoods Joint Venture.
- Completed a **Daniel Boone National Forest** (DBNF) contract to update records of rare species and communities as well as occurrences of invasive species on the national forest.

Aquatic Conservation –

- Completed sampling for the Upper Cumberland River fish project, funded by the U.S. Fish and Wildlife Service. The objective is to determine the distribution of the federally-listed species, **blackside dace, Cumberland darter**, and candidate species, **Cumberland arrow darter**. New locations of blackside dace and Cumberland arrow darter were made.
- Surveyed mussels within the **Marsh Creek** watershed. **Only four live specimens** were found. A multi-agency cooperative effort (USFWS, USFS, KDOW, KDFWR, KSNPC) was initiated to determine the **cause of the collapse of the Marsh Creek mussel fauna**, and if current stream conditions will support reintroduction of captive propagated specimens. Water quality monitoring and bioassessment are ongoing.
- Continued monitoring of **Cumberland papershell** in the Upper Cumberland River basin. Numerous historical sites and new locations were surveyed. The species has been found in only 3 streams (Marsh, Mud, and Pine creeks) in recent years.
- Reported on the effects of beaver colonization on blackside dace at Cumberland Gap Historical National Park. The chronic persistence of beaver colonization indirectly caused the collapse of the blackside dace population. Currently, we are working with NPS and USFWS staff to establish recovery efforts.
- Completed surveys for the **Sinking Creek** fish-host project, supported by the U.S. Fish and Wildlife Service. The objectives are to determine the abundance of fish-host species necessary to the life cycle of the federally-listed Cumberland elktoe and Cumberland bean pearly mussel.

- Surveyed **Bayou de Chien** for the **federally-endangered relict darter** in Graves and Hickman Counties, to determine the population size of the relict darter and its habitat associations.

Invertebrate Conservation -

- Received a $15,000 grant from USFWS to conduct a feasibility study for the reintroduction of an experimental population of the federally endangered **American burying beetle.** The largest carrion beetle in the U.S., it has not been observed in Kentucky since 1974.
- Conducted statewide surveys for rare invertebrates, especially at KSNPC's high priority conservation sites. The databases for these species now contain approximately 22,470 species records.
- Provided technical advice to the USFWS regarding prelisting and conservation measures the federal agency could implement for invertebrate species in Kentucky.

***Kentucky's Natural Heritage, An Illustrated Guide to Biodiversity* –**

A compelling book about Kentucky's biodiversity was released by the Commission in 2010. Many positive reviews of this publication noted there has **never been such a comprehensive look at Kentucky's natural treasures**. It focuses on the rarest species of plants and animals, some of which are found no where else in the world. The book was written to educate Kentuckians about the Commonwealth's natural qualities, and inspire citizens to support conservation. A primary goal was for teachers to use it as a **resource book in classrooms** for biodiversity studies. **KET** has been a lynchpin in this effort and in 2012 began developing on-line teaching units and obtained a grant to develop an "e-version" of the biodiversity guide, which will begin in 2013.

A. USES OF NATURAL HERITAGE DATA –

The Commission provides natural heritage data to other state, local and federal agencies and conservation organizations through data agreements. It is invaluable resource, providing government and the private sector with **current**, **reliable data** for environmental impact statements, biological analyses, research, and long-term conservation planning. We responded to **280 data requests** during fiscal years 2011 and 2012. Funding provided by data access

agreements helps offset the cost of keeping the data current, accurate and complete as well as meeting the expense of computer hardware and software.

The natural heritage data is maintained in **BIOTICS**; which was developed by NatureServe solely for use by natural heritage programs. **NatureServe** is the umbrella non-profit data center which compiles and manages the natural heritage data from the U.S., Canada and Latin America. An annual subscription fee of $15,000 is paid to NatureServe to keep BIOTICS current. Kentucky's natural heritage database currently contains an impressive **12,436 species** and **ecological community** records, **762 high value site** records, including caves, and **601 conservation lands** records.

The use of BIOTICS allows our **data to be compared** with data from other states and countries throughout North and South America. This enables NatureServe to rank species and natural communities on **a *global* level.** Conversely, the Commission is responsible for state level ranking (endangered, threatened, and special concern species which are found in Kentucky). This natural heritage **data is made available to other state and federal agencies** for many purposes, including reviews for development projects (Energy and Environment Cabinet and Transportation Cabinet); Outstanding State Resource Water designations (Division of Water); Species of Greatest Conservation Need (Kentucky Department of Fish and Wildlife Resources); species status reviews for federal listing (U.S. Fish and Wildlife Service), and forest species conservation (Division of Forestry and U.S. Forest Service).

Some of the **changes experienced by Kentucky's rare species** can be revealed by examining the natural heritage data for the two-year period from November 2010 to November 2012. One category used to monitor the status of a species is the "**federal protection status**" – a designation of those species in need of federal protection because of threats to habitat and other factors affecting the survival of the species. The numbers keep increasing. Over the past 2 years:

- **10 species were elevated to either federally listed or proposed to be listed:**
  - **6 species were designated Listed Endangered**
  - **3 species were designated Proposed Endangered**
  - **1 species was designated Proposed Threatened**

Since 1993 we have designated an additional 39 plant species as historic (not observed in 20 years), indicating an overall trend of the loss of native species from Kentucky's flora.

B. CONSERVATION PLANNING –

The Commission has been involved in conservation planning with a variety of organizations such as **Kentucky Natural Lands Trust** on projects including the **Pine Mountain Wildlife Corridor** and the **Fort Knox-Bernheim Wildlife Corridor**. We provided natural heritage data to the **Kentucky Chapter of The Nature Conservancy** to assist with projects in its focus areas. Commission data was used to support a diverse array of projects such as biological assessments for numerous infrastructure and development projects statewide, identifying significant areas for **Wildlife Species of Greatest Conservation Need** for the State Wildlife Grants (KDFWR), and a reassessment of the federal status of white-haired goldenrod, a Kentucky endemic which grows only in the Red River Gorge area.

The use of **Geographic Information Systems (GIS)** enables us to provide meaningful data and comments in a timely manner and provide accurate information in many user-friendly formats. The development of new services such as delivering real-time data to other agencies, providing **searchable data to the public via the Web**, and creating GIS display products has made the natural heritage data more accessible and useful in conservation planning by partner agencies.

The Commission continues to enhance custom GIS applications created for the **Department for Natural Resources**, for surface coal mine permit reviews and for the **Division of Abandoned Mine Lands** for reclamation project reviews. The applications we created provide a suite of tools to streamline the review process saving staff time, providing permit reviewers with new tools and enabling them to access the latest imagery and spatial data available.

The Commission assisted the **Kentucky Heritage Lands Conservation Fund Board** by developing a GIS program to track all the lands they have funded since 1995. This provides an ability to display and evaluate protected lands. Tools like this can increase the effectiveness of future acquisitions by identifying areas lacking in protected natural lands and connecting areas key to wildlife conservation.

The Commission is the designated Kentucky partner for the **USGS Protected Areas Database.** Using a grant from USGS in 2011 and 2012, we compiled records from land trusts, private organizations and state and local agencies throughout Kentucky, identifying parcels and categorizing protection level to the USGS standard for all individual tracts under management. This dataset will be combined with data from the rest of the U.S. and widely shared to facilitate **conservation planning at both local and national levels**. Commission staff were commended

by the U.S. Geological Society for the high quality of the completed map products.

The Commission also used GIS to generate public information by creating the ***Conservation Lands Map*** – a map of federal, state and privately managed lands that retain natural qualities at various levels. This is a key tool to document the status of land conservation in Kentucky and help prevent conflicts with land development projects by identifying important areas before resources are expended.

IV. ADDITIONAL COMMISSION PROJECTS:

A. GRANTS AND CONTRACTS GENERATE AGENCY RECEIPTS –

During 2011 and 2012, KSNPC undertook grant and contract work in addition to the regular demands of agency operations, to generate **agency receipts** to balance the Commission's budget. While contract work benefits the budget, it diverts our biologists from their most important work with rare species conservation. The following table lists major projects undertaken by the Commission for FY 2012:

U.S. Fish and Wildlife Service, Endangered Species Act (Federally listed plants)	$52,000
U.S. Geological Survey (data services-mapping)	$25,000
KY Aquatic Resources Fund (aquatic study)	$16,000
Ky. Dept. for Natural Resources (data for surface mine permit review)	$33,000
Division of Abandoned Mine Lands (data for project review)	$ 5,000
Heritage Land Conservation Fund and other (Biological surveys)	$110,000
U.S. Forest Service (biological surveys)	$ 21,000
National Park Service – Cumberland Gap Nat'l Park, rare plant survey	$ 7,500
Heritage Land Conservation Fund – GIS/Spatial Data Development	$ 3,000
Clarks River National Wildlife Refuge (USFWS) – natural community mapping	$ 2,180
NatureServe - Survey of Bogs and Seeps on Cumberland Plateau	$ 5,990
Grants/Contracts receipts total for 2012	**$237,951**

B. KENTUCKY PRESCRIBED FIRE COUNCIL –

The Commission continues to work with other state and private organizations to **raise awareness** about the increased need to use **prescribed fire** as a tool to restore those natural community types that evolved with fire as a natural element, i.e. **prairie remnants and barrens**. The KY Fire Council has developed **training standards** and continues working on air quality concerns. It is coordinating research efforts and creating educational materials on **the safe use of prescribed fire**. The Nature Preserves Branch Manager led the organization as chair during the biennium. The Fire Council is working with the Kentucky Division of Forestry to propose legislation to set standards for the professional use of prescribed fire.

C. SOUTHEAST REGION REPRESENTATIVE U.S. COUNCIL –

The Commission's director was re-elected in 2011 to a third term as a southeast representative on the U.S. Section Council of NatureServe. NatureServe is the parent organization for our natural heritage program. This gives Kentucky a stronger voice in this non-profit, international conservation organization, and provides opportunities to benefit from the innovations developed by heritage programs in other states. As part of this work, the director led a group which created the first formal standards for heritage programs in the U.S. and Canada.

D. CONSERVE KENTUCKY –

KSNPC's director was appointed to the General Assembly's Land and Stewardship Conservation Task Force, co-chaired by **Senator Brandon Smith** and former **Representative Charlie Hoffman** in 2009. The task force's final report recommended **expanded land conservation across Kentucky**. The task force findings recognized the need to: protect water resources, agricultural lands and forests to curb the destruction of wildlife habitats, prevent the loss of outdoor recreation space to promote tourism, and to preserve the state's biodiversity and essential ecological functions.

Several participants from the task force, including the Commission, have continued working through a new coalition, Conserve Kentucky. It has made significant progress having gained funding and assistance from the national **Trust for Public Land**, **The Nature Conservancy** and the **Doris Duke Foundation**. A public opinion poll was completed, revealing strong support across all demographics in Kentucky for increased conservation of water and land resources.

E. EDUCATING KENTUCKIANS –

The third prong of the agency's mission is to educate Kentuckians about the value of biodiversity conservation and the importance of state nature preserves. The Commission has never had sufficient staff to dedicate a position solely to education, but has addressed this mission by spreading it among all staff. **Kentucky Educational Television (KET)** continues to **partner** with KSNPC by presenting biodiversity and conservation issues on its program ***Kentucky Life.*** We have also partnered with KET in adapting our book, *"An Illustrated Guide to Biodiversity of Kentucky"* into units for use in teaching science in schools.

The Commission also pursues its education mission through its website: **http://naturepreserves.ky.gov**, which includes the **Rare Plant Database**. The **State Nature Preserve/Natural Areas Directory** allows visitors to print preserve brochures with hiking trails. **Fact sheets** on trees, plants, insects and invasive exotic species are accessible, as well as our **scientific series of books** which are available for purchase. A county-by-county list of rare species is also available.

The ***Naturally Kentucky*** **newsletter** is distributed biannually via e-mail to nearly 2,000 recipients. Commission biologists are frequent guest lecturers in classrooms and organizational meetings.

F. REGISTERED NATURAL AREAS –

The Kentucky Natural Areas Registry enrolls high quality natural areas owned by private individuals, agencies or organizations to encourage them to wisely steward significant natural sites. The registry is a non-binding program that recognizes landowners who agree to exercise good stewardship of ecologically significant property. With 93% of the state in private ownership it is crucial to partner with private landowners to be successful. The registry encourages the preservation of important habitat on private and public lands that are not available for acquisition, or may not qualify for dedication as a state nature preserve. The registry is educational for many private landowners, who may not be aware of special biological values of land they own. Registry can also avoid the inadvertent destruction of significant biological resources.

As of December 2012, a total of 58 landowners with interests in 67 different sites are enrolled in the Natural Areas Registry program. These agreements encompass 8,201 acres and are found in 47 counties. Registry agreements provide voluntary protection for 43 state-listed species and 21 of our 62 state natural community types.

V. CONCLUSION:

KRS 146.485(13) directs the Commission to report to the Governor and General Assembly on matters which may significantly affect the natural ecology or the human environment, and to recommend actions to prevent significant adverse effects which would harm **our quality of life**. To this end, the Commission ***Recommends***:

1. Increase significantly the rate of land conservation in Kentucky.

Kentucky has fewer state owned conservation lands than any of the seven surrounding states. **Conservation lands are key** to protecting **biodiversity** and providing the **eco-services, i.e. filtering surface water, adding oxygen and cooling summer air, providing pollinators, etc.,** which are necessary to the quality of life for our citizenry. Land is being developed at a rapid rate, and conservation opportunities are being lost, never to be regained in our lifetimes.

2. Develop a climate change action plan.

A plan must be developed to **prepare for climate change** and its impacts on the biota and habitats of Kentucky. Because these changes will affect all of us, the plan must be developed **inclusively** with the participation of KDFWR, USFWS, the Dept. of Natural Resources., The Nature Conservancy, and other resource and conservation agencies and groups. **A state wide plan** is needed to identify and conserve key areas of the landscape to interconnect migratory corridors and facilitate wildlife travel. A climate action plan can be distributed to educate and inform agencies involved with, or regulating land development. This will enable such agencies to make better informed land use decisions to protect conservation lands and ensure continued eco-system services.

3. ***Increased stewardship capacity to protect and manage conservation lands and increase public access to them.***

Particularly following the reduced budgets of the last several years, the capacity of the Commission and other state agencies which are entrusted with natural lands has not kept pace with the pressing needs to manage these special areas. Habitat restoration and controlling invasive species are labor intensive tasks. The Commission last added a stewardship position in 1998, yet has gained *13,816 acres!* Worsening that situation, we *lost* one stewardship position in 2010 due to the budget shortfall and we have had 2 unfilled vacancies for most of 2012 due to the lack of general funds. When stewardship is fully staffed, we only have 5 people to manage 27,180 acres. **We are losing ground in the stewardship of the state's preserves.**

4. Restore critical biologist positions.

We need to restore and maintain our capacity for biological surveys. In December 2008 we lost our only terrestrial zoologist to survey **birds, mammals, reptiles and amphibians.** This loss impacts our ability to conduct basic biological surveys and will also **adversely impact other agencies, which rely on the Commission for this data.** We need to restore this core biologist position.

The Kentucky State Nature Preserves Commission, despite being a small agency, has created an impressive system of state nature preserves, safeguarding some of the most unique habitats in Kentucky. The Commission is the **best resource** for information on the **rare species** and **natural areas** of the state. This biological data is relied upon by multiple federal and state agencies, private consultants and Kentucky's scientific community. Our biologists, ecologists and preserve stewardship staff are recognized **experts in their fields,** well respected among their peers.

A great deal has been accomplished by the Commission in 36 years, but much work remains to be done. Over **27,180 acres have been forever protected as preserves**, but considering that **Kentucky has over 25 million acres**, it is apparent we need a greatly expanded preserve system to protect at least **one viable example** of each of Kentucky's many unique natural communities. We currently have 23 of 62 protected. Other natural areas are held under public ownership, but the Commission's nature preserves are the best-

protected **repository for Kentucky's biological diversity,** as that is their first purpose.

To forge ahead with our task of surveying the **nearly *half* of Kentucky** that has yet to be inventoried for the best surviving natural areas, we need a **second ecologist.** Kentucky is losing 80 acres *daily* to development. With a single ecologist it will take an estimated **15 *years*** to complete a first natural areas inventory of the state.

The great variety of plant and animal species and unique natural areas that make Kentucky unique and ecologically diverse are perhaps the **most precious endowment** we can leave to our children and their children. In 1976 the **General Assembly declared** that,

> "As a part of the continuing growth of the population and the economic development of the Commonwealth, **it is necessary and desirable** that the overall impact on the **natural ecology be considered** when major alterations are proposed affecting same and that certain areas of unusual natural significance **be set aside and preserved** for the benefit of present and future generations. Such unique areas are valuable to the **vital human dependence upon fresh air, clean water and unspoiled natural areas**."

The impending threat of **climate change** is adding a **new urgency** to this mission. As noted by the U.S. Fish and Wildlife Service, "Climate change is real and its here." It will potentially have **more far-reaching impacts on wildlife and wildlife habitat than any challenge that has come before us.** We need to lay the ground work now for the best adaptive measures we can devise to ensure the greatest survival of our critical biological resources. The maxim that an **ounce of prevention** is worth a pound of cure is particularly applicable **– *conservation*** is far more effective and less costly than ***restoration***. It is the task of the Kentucky State Nature Preserves Commission to **protect our natural heritage –** but in order to be successful **we are in critical need of greater resources**.

ppendix 1. Plants and Animals Presumed Extinct or Extirpated from Kentucky

Only species that were previously known from Kentucky appear on these lists. They are considered **Extinct** if they no longer exist anywhere in the world, and **Extirpated** if they no longer are found in the wild in Kentucky, but are still in existence elsewhere.

Extinct Species

Bird

- Carolilna Parakeet
- Passenger Pigeon

Freshwater Mussel

- Sugarspoon
- Angled Riffleshell
- Cincinnati Riffleshell
- Leafshell
- Yellow Blossom
- Acornshell
- Forkshell
- Round Combshell
- Tennessee Riffleshell
- Wabash Riffleshell
- Cumberland Leafshell
- Tubercled Blossom
- Rough Rockshell

Vascular Plant

- Stipuled Scurf-pea

Insect

- Robust Pentagenian Burrowing Mayfly

Fish

- Harelip Sucker

Extirpated Species

Bird

- Ivory-billed Woodpecker
- Red-cockaded Woodpecker
- Greater Prairie-chicken

Mammal

- American Bison
- Gray Wolf
- Red Wolf
- Eastern Cougar

Vascular Plant

- Canada Anemone
- Powdery Cloakfern
- Clustered Poppy-mallow
- Marsh Marigold
- Inflated Sedge
- Long-bract Green Orchis
- Showy Lady's-slipper
- Southern Shield Wood Fern
- American Water-pennywort
- Coarse Sumpweed
- Fraser's Loosestrife
- Trailing Loosestrife
- Spotted Bee-balm
- Swamp Lousewort
- Slender Dragon-head
- Heart-leaved Plantain
- Prairie Parsley
- Barbed Rattlesnake-root
- American Wintergreen
- Swamp Saxifrage
- Small-fruit Bulrush
- Eastern Turkeybeard

Freshwater Mussel

- White Catspaw
- Cracking Pearlymussel
- Scaleshell
- Slabside Pearlymussel
- White Wartyback
- Winged Mapleleaf
- Rayed Bean

Fish

- Scaly Sand Darter
- Diamond Darter
- Gravel Chub
- Least Darter
- Southern Brook Lamprey
- Greater Redhorse
- Blotchside Logperch

Snail

- A Terrestrial Snail (*Catinella gelida*)
- Mellow Column
- Lowland Pillsnail
- Great Lakes Snaggletooth
- Temperate Coil
- A Terrestrial Snail (*Succinea bakeri*)
- Multirib Vallonia
- Trumpet Vallonia
- Hubricht's Vertigo
- Cross Vertigo

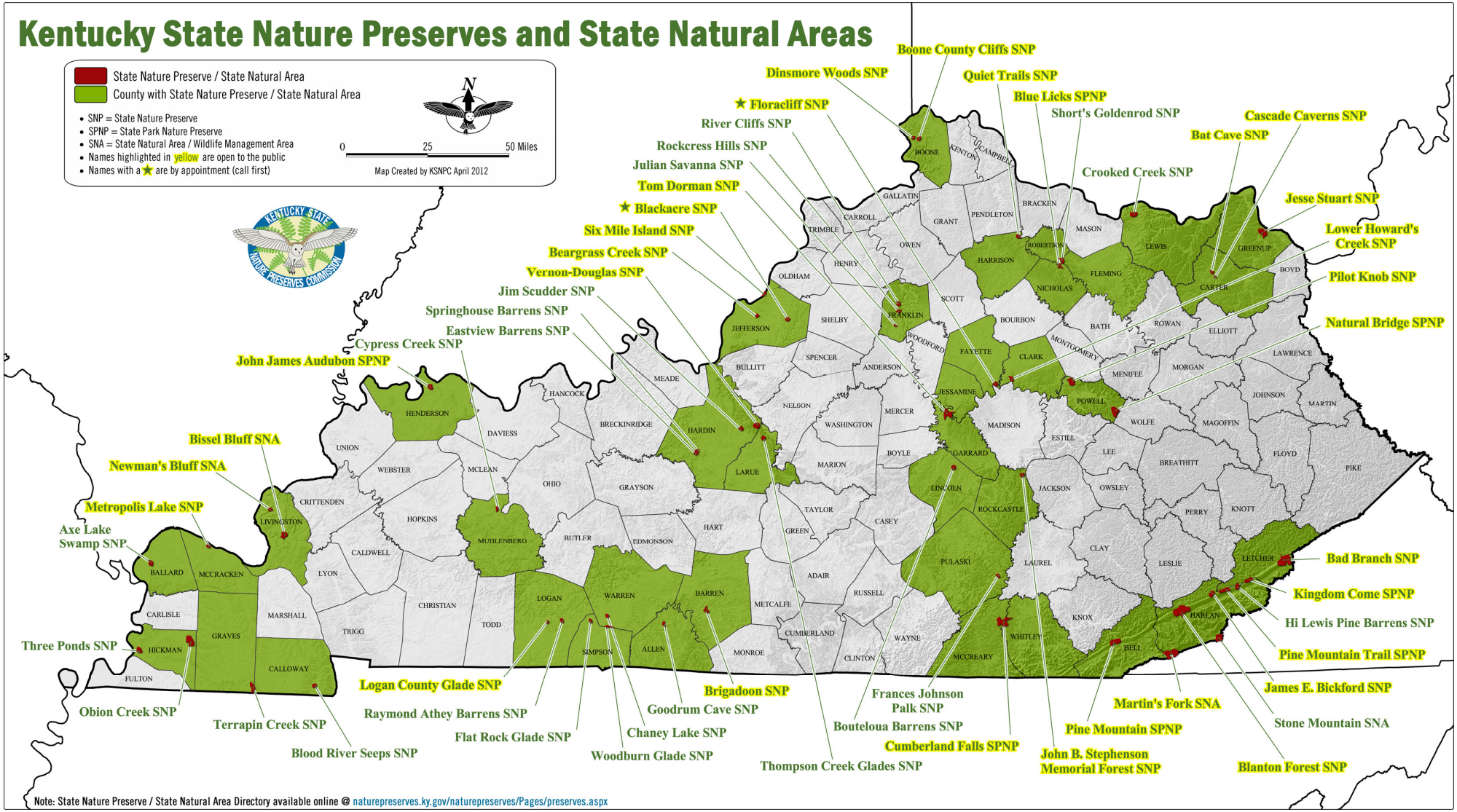
Insect

- American Burying Beetle

Reptile

- Coachwhip (snake)

Appendix 2. Kentucky State Nature Preserves & Natural Areas Map



Appendix 3. List of Dedicated State Nature Preserves.

COUNTY	STATE NATURE PRESERVE	FEATURES	ACRES
Allen	Carpenter Cave CE*	Federally listed bat site	14
	Goodrum Cave SNP	Federally listed bat site	51
Ballard	Axe Lake Swamp SNP	Wetland	458
Barren	Brigadoon SNP	Mature forest	184
	Mutters Cave SNP	Federally listed bat site	108
Bell	Pine Mountain SPNP	Forest	868
Boone	Boone County Cliffs SNP	Glacial feature	75
	Dinsmore Woods SNP	Mature forest	107
Bullitt	Apple Valley Glades SNP	Federal candidate plant	60
Calloway	Blood River Seeps SNP	Unique wetland	193
Carter	Bat Cave SNP	Federally listed bat site	128
	Cascade Caverns SNP	Rare plants	18
Christian	Bob Overton Cave CE	Federally listed bat site	55
Clark	Lower Howard's Creek SNP	Federally listed plant site	228
Fayette	Floracliff SNP	Geologic feature	287
Fleming	Short's Goldenrod SNP	Federally listed plant site	210
Franklin	Feindel CE	Federally listed plant site	15
	Julian Savanna SNP	Unique woodland	42
	River Cliffs SNP	Federally listed plant site	210
	Rockcress Hills SNP	Federally listed plant site	65
Garrard	Tom Dorman SNP	KY River Palisades	764
Graves	Terrapin Creek SNP	Unique wetland	268
Greenup	Jesse Stuart SNP	Forest	714
Hardin	Eastview Barrens SNP	Rare plant site	119
	Jim Scudder SNP	Rare plant site	231
	Springhouse Barrens SNP	Rare plant site	54
	Vernon-Douglas SNP	Mature forest	730
Harlan	Blanton Forest SNP	Old growth forest	3124
	Hi Lewis SNP	Pine woodland	303
	James E. Bickford SNP	Forest	348
	Martin's Fork SNA	Wild River corridor	1601
	Pine Mountain Trail SPNP	Rare plant site	609
	Stone Mountain SNA	Rare plant site	1025
Harrison	Quiet Trails SNP	Forest	165
Henderson	John James Audubon SPNP	Forest	339
Hickman	Obion Creek SNP	Wetland	1601
	Three Ponds SNP	Wetland	528
Jefferson	Beargrass Creek SNP	Environmental education site	41
	Blackacre SNP	Environmental education site	175
	Six Mile Island SNP	Riverine island	81
Jessamine	Tom Dorman SNP	KY River Palisades	143
Larue	Thompson Creek Glades SNP	Rare plant site	169

Letcher	Bad Branch SNP	Rare plant/animal site	2639
Letcher	Kingdom Come SPNP	Federally listed bat site	225
Lewis	Crooked Creek SNP	Rare plant site	694
Lincoln	Bouteloua Barrens SNP	Large grassland	261
Livingston	Bissell Bluff SNA	Forest	563
	Newman's Bluff SNA	Federally listed plant site	169
Logan	Logan County Glade SNP	Rare plant site	42
	Raymond Athey Barrens SNP	Rare plant site	156
McCracken	Metropolis Lake SNP	Wetland	123
McCreary	Cumberland Falls SNP	Waterfalls and forest	1294
Muhlenberg	Cypress Creek SNP	Wetland	98
Powell	Natural Bridge SPNP	Forest, rock arches	1188
	Pilot Knob SNP	Geologic feature	742
Pulaski	Francis Johnson Palk SNP	Wetland/seep	150
Robertson	Blue Licks SPNP	Federally listed plant site	53
Rockcastle	John B. Stephenson SNP	Forest and waterfall	123
Simpson	Flat Rock Glade SNP	Rare plant site	99
Warren	Chaney Lake SNP	Transient lake	169
	Woodburn Glade SNP	Rare plant site	20
Whitley	Laurel Fork SNP (dedication pending)	Forest, federally listed aquatic site	1864
	TOTAL NUMBER OF COUNTIES		**38**
	TOTAL NUMBER OF PRESERVES		**61**
	TOTAL NUMBER OF ACRES		**27,180**

*CE indicates land protected by a conservation easement.

A directory of the state nature preserves is available upon request, or at http://naturepreserves.ky.gov.